

WHAT IS CLAIMED IS:

1. A method for underground drilling, the method comprising:
  - 5 a) generating high intensity pressure pulses at the surface of an area to be drilled;
  - b) coupling the high intensity pressure pulses into drilling mud being pumped into a drill string;
  - 10 c) allowing the high intensity pressure pulses to propagate down the drill string to an underground location; and,
  - d) allowing the high intensity pressure pulses to do work at the underground location.
- 15 2. The method of claim 1 wherein the work comprises causing a flow of drilling fluid through nozzles in a drill bit at the bottom of the drill string to fluctuate.
- 20 3. The method of claim 1 wherein the work comprises operating a down hole tool.
- 25 4. The method of claim 3 wherein operating the downhole tool comprises forcing a portion of the drill string which includes the drill bit suddenly downwardly.
- 30 5. The method of claim 4 wherein generating the high intensity pressure pulses comprises causing drilling mud to flow in a conduit and

suddenly and periodically interrupting the flow of drilling mud in the conduit.

- 5        6.    The method of claim 3 wherein operating the downhole tool comprises lifting a portion of the drill string which includes the drill bit upwardly and compressing a spring.
- 10      7.    The method of claim 6 wherein generating the high intensity pressure pulses comprises causing drilling mud to flow in a conduit and suddenly and periodically interrupting the flow of drilling mud in the conduit.
- 15      8.    The method of claim 1 wherein generating the high intensity pressure pulses comprises causing drilling mud to flow in a conduit and suddenly and periodically interrupting the flow of drilling mud in the conduit.
- 20      9.    The method of claim 8 wherein causing drilling mud to flow in a conduit comprises diverting a portion of a main flow of drilling mud from a mud pump to the drill string into the conduit.
- 25      10.   The method of claim 9 comprising returning mud which has flowed through the conduit to a mud tank.
- 30      11.   The method of claim 9 comprising providing a point at which a hydrostatic pressure of drilling mud flowing toward a drill string in

a main conduit is reduced and introducing mud which has flowed through the conduit into the main conduit at the point of reduced pressure pressure.

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12. The method of claim 11 wherein providing a point at which a hydrostatic pressure of drilling mud flowing toward a drill string in a main conduit is reduced comprises providing a jet pump and causing drilling mud flowing in the main conduit to pass through the jet pump.

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13. The method of claim 1 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped into a drill string is performed upstream from the flexible hose.

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14. The method of claim 4 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped into a drill string is performed upstream from the flexible hose.

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15. The method of claim 6 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped into a drill string is performed upstream from the flexible hose.
- 10 16. The method of claim 1 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped into a drill string is performed downstream from the swivel.
- 15 17. The method of claim 4 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity pressure pulses into drilling mud being pumped into a drill string is performed downstream from the swivel.
- 20 18. The method of claim 6 practised on a drilling rig having a drill string suspended from a swivel and a flexible hose carrying drilling mud into the swivel for passage down the drill string and coupling the high intensity
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pressure pulses into drilling mud being pumped into a drill string is performed downstream from the swivel.

- 5 19. Underground drilling apparatus comprising:
- a) a drill string;
  - b) a mud pump;
  - c) a main conduit carrying mud pumped by the mud pump toward the drill string;
  - 10 d) pulse generator means located at the surface for generating high intensity pressure pulses;
  - e) pulse transmission means for coupling high intensity pressure pulses generated by the
  - 15 pulse generator means into mud being pumped toward the drill string.